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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DANG, PHUC T

ART UNIT PAPER NUMBER

2818

DATE MAILED: 08/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/777,207

Applicant(s)

FISCHER ET AL.

Examiner

PHUC T. DANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amendment filed July 8, 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5 and 6 is/are rejected.
- 7) ☒ Claim(s) 7-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Response to Arguments

1. Applicant's argument filed on July 8, 2005 with respect to claims 1-3 and 5-11 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morris (U.S. Patent No. 4,200,474) in view of Jang et al., hereinafter "Jang" (U.S. Publication No. US 2004/0051134 A).

Regarding claim 1, Morris discloses a semiconductor device, comprising:

- a first doping region (11, Fig. 3), which has a first conduction type (p-type);
- a second doping region, (12, Fig. 3), which has the first conduction type (p-type) and is spaced apart from the first doping region (11, Fig. 3);
- a channel region (Fig. 3), which lies between the first and second doping regions; and has a second conduction type (N-type);
- a gate structure (28, 27, 24, Fig. 4) provided above the channel region, wherein the gate structure having a first gate dielectric (24, Fig. 4) made of a first material with a first thickness and a first dielectric constant, which is situated directly above the channel region, and

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an overlying second gate dielectric (27, Fig. 4) made of a second material with a second thickness and a second dielectric constant, which is significantly greater than the first dielectric constant [col. 3, lines 6-14], and

the first thickness of the first gate dielectric (24, Fig. 4) and the second thickness of the second gate dielectric (27, Fig. 4) configured such that the corresponding thickness of gate structure with the first gate dielectric (24, Fig. 4), to obtain a same threshold voltage, is at least of a same magnitude as a thickness equal to sum of the first thickness and the second thickness [col. 5, lines 3-18]

Morris discloses all the features of the claimed invention as discussed above, but does not disclose the gate structure has a third gate dielectric made of silicon dioxide, which is provided above the second gate dielectric.

Jang, however, discloses the gate structure has a third gate dielectric made of silicon dioxide, which is provided above the second gate dielectric [Fig. 2 and paragraph 0018].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the teaching of Jang to Morris discussed above such that the gate structure has a third gate dielectric made of silicon dioxide, which is provided above the second gate dielectric for a purpose of improving reliability of the memory cell devices.

Regarding claims 2-3, Morris discloses wherein the first material is silicon dioxide and the second material is a transition metal oxide which is a binary metal oxide selected from the group of Al_2O_3 , Y_2O_3 , La_2O_3 , TiO_2 , ZrO_2 , HfO_2 [col. 2, lines 27-40].

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Regarding claim 5, Morris discloses wherein a field-effect transistor is involved [col. 1, lines 12-14].

Regarding claim 6, Sato discloses a parasitic field-effect transistor is involved [col. 3, lines 4-9].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the teaching of Sato to Morris discussed above such that a parasitic field-effect transistor is involved for a purpose of maintaining a satisfactory break down voltage.

Allowable Subject Matter

3. The following is a statement of reason for the indication of allowable subject matter:

Claims 7-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

None of the Prior Art made of record discloses wherein the first doping region is a filling electrode of a trench capacitor of a memory cell, the second doping region is a semiconductor substrate and the channel region is connection region of an associated selection transistor to gate connection of the filling electrode and the gate structure comprises an insulation collar of the trench capacitor as cited in claim 7 and wherein the first doping region and the second doping region are provided at surface of a semiconductor substrate and are isolated by an isolation trench filled with an insulator material, and the gate structure is provided at least on the trench bottom as cited in claim 9.

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Claim 8 is depend on claim 7 and claims 10-11 are depend on claim 9, then they also would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is (571) 272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.
5. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and After Final communications.
6. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang

PV



Primary Examiner

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